

WHAT IS CLAIMED IS:

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1. A viewing optical system comprising:  
an objective system for forming an image of an  
5 object;  
an eyepiece system for enlarging and directing the  
image to a pupil;  
a hologram combiner comprising a volume-type, phase-  
type, and reflective-type hologram and having an optical  
10 power for constructing an equivalent surface which is  
optically equivalent to the image surface at a different  
position than the image surface as viewed from the pupil;  
and  
an information display means for displaying  
15 information on the equivalent surface,  
wherein the hologram combiner transmits light from  
the image and reflects light from the information display  
means so that the image can be viewed with the  
information overlaid thereon.

2. A viewing optical system, as claimed in  
claim 1, further comprising:  
a mirror for reflecting the image formed by the  
objective system;  
5 a focusing screen;  
a condenser lens; and  
a pentagonal prism for inverting the image, said  
pentagonal prism having a plurality of surfaces, said  
hologram combiner being disposed on one of said plurality  
10 of surfaces.

3. A viewing optical system, as claimed in claim 2, wherein said information display means comprises an illumination light source and a display element, said display element for modulating light from the illumination light source so as to display information on the equivalent surface.

4. A viewing optical system, as claimed in claim 2, said information display means comprising:  
an illumination light source;  
a display element, said display element for modulating light from the illumination light source so as to display information on the equivalent surface;  
an image reforming mirror;  
an image forming lens; and  
an incidence surface,  
wherein said display element modulates light from the illumination light source so as to display information, said image reforming mirror reflects the information, displayed by the display surface, toward the image forming lens, and said image forming lens transmits the information to the equivalent surface.

5. A viewing optical system, as claimed in claim 2, said information display means comprising:  
an illumination light source;  
a display element; and  
an image forming lens having a selective reflective surface,  
wherein said display element modulates light from the illumination light source so as to display information and said image forming lens transmits the information to the equivalent surface.

6. A viewing optical system, as claimed in claim 2, said information display means comprising:

an illumination light source;

a display element; and

5 an image forming prism,

wherein said display element modulates light from the illumination light source so as to display information and the image forming prism transmits the information to the equivalent surface.

7. A viewing optical system, as claimed in claim 1, further comprising:

a field frame; and

5 an inverting system comprising a first prism and a second prism arranged with a small space therebetween, the small space forming a TIR surface, the hologram combiner being disposed on a second prism side of the TIR surface, and

10 wherein the objective system comprises a plurality of lenses and a prism.

8. A viewing optical system, as claimed in claim 1, wherein the viewing optical system is a reverse Galileo type optical system.

9. A viewing optical system, as claimed in claim 1, further comprising a relay lens for inverting the image.

10. An optical apparatus comprising a viewing optical system, said viewing optical system comprising:  
an objective system for forming an image of an object;

5 an eyepiece system for enlarging and directing the image to a pupil;

a hologram combiner comprising a volume-type, phase-type, and reflective-type hologram and having an optical power for constructing an equivalent surface which is  
10 optically equivalent to the image surface at a different position than the image surface as viewed from the pupil;  
and

an information display means for displaying information on the equivalent surface,

15 wherein the hologram combiner transmits light from the image and reflects light from the information display means so that the image can be viewed with the information overlaid thereon.

11. An optical apparatus, as claimed in claim 10, said viewing optical system further comprising:

a mirror for reflecting the image formed by the objective system;

5 a focusing screen;

a condenser lens; and

a pentagonal prism for inverting the image, said pentagonal prism having a plurality of surfaces, said hologram combiner being disposed on one of said plurality  
10 of surfaces.

12. An optical apparatus, as claimed in claim 11, wherein said information display means comprises an illumination light source and a display element, said display element for modulating light from the  
5 illumination light source so as to display information on the equivalent surface.

13. An optical apparatus, as claimed in claim 11,  
said information display means comprising:  
an illumination light source;  
a display element, said display element for  
5 modulating light from the illumination light source so as  
to display information on the equivalent surface;  
an image reforming mirror;  
an image forming lens; and  
an incidence surface,  
10 wherein said display element modulates light from  
the illumination light source so as to display  
information, said image reforming mirror reflects the  
information, displayed by the display surface, toward the  
image forming lens, and said image forming lens transmits  
15 the information to the equivalent surface.

14. An optical apparatus, as claimed in claim 11,  
said information display means comprising:  
an illumination light source;  
a display element; and  
5 an image forming lens having a selective reflective  
surface,  
wherein said display element modulates light from  
the illumination light source so as to display  
information and said image forming lens transmits the  
10 information to the equivalent surface.

15. An optical apparatus, as claimed in claim 11,  
said information display means comprising:  
an illumination light source;  
a display element; and  
5 an image forming prism,  
wherein said display element modulates light from  
the illumination light source so as to display

information and the image forming prism transmits the information to the equivalent surface.

16. An optical apparatus, as claimed in claim 10, said viewing optical system further comprising:

a field frame; and

5 an inverting system comprising a first prism and a second prism arranged with a small space therebetween, the small space forming a TIR surface, the hologram combiner being disposed on a second prism side of the TIR surface, and

10 wherein the objective system comprises a plurality of lenses and a prism.

17. An optical apparatus, as claimed in claim 10, wherein the viewing optical system is a reverse Galileo type optical system.

18. An optical apparatus, as claimed in claim 10, further comprising a relay lens for inverting the image.